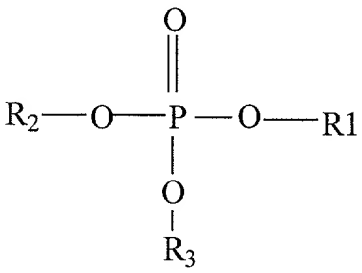
CLAIMS

We claim:

1. A wood composite material comprising:

(i) an organophosphorus ester compound, and (ii) a polymer binder resin.

2. The wood composite material according to claim 1, wherein the organophosphorus ester has the formula:



and R_1, R_2 and R_3 are independently either alkyl or aryl chains having hydroxyl, carboxylic or both hydroxyl and carboxylic functionality.

3. The wood composite material according to claim 1 wherein the at least one organophosphorus ester is at least one ester selected from the group consisting of diethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphate; dimethyl methyl phosphate; diethyl-N, N-bis(2-hydroxyethyl) aminoethyl phosphonate; dimethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphonate; dipropyl-N, N-bis(3-hydroxypropyl) aminoethyl phosphonate; and dimethyl-N, N-bis(4-hydroxybutyl) aminomethyl phosphonate.

4. The wood composite material according to claim 1, wherein the organophosphorus ester is at least one ester selected from the group consisting of diethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphate and dimethyl methyl phosphate.

5. The wood composite material according to claim 1 comprising from about 5 wt% to about 30 wt% of the organophosphorus ester compound.

6. The wood composite material according to claim 2 wherein said polymeric binder is selected from the group consisting of isocyanates, phenol-formaldehydes, and melamine urea formaldehyde.

7. The wood composite material according to claim 1 wherein the composite material comprises about 5 to about 30 wt % of the organophosphorus ester compound and about 3 to about 20 wt % of the polymeric binder.

8. The wood composite material according to claim 1 wherein the composite material comprises about 5 to about 10 wt % of the organophosphorus ester and about 3 to about 10 wt % of the polymeric binder.

9. The wood composite material according to claim 1, wherein the at least one organophosphorus ester forms cross-links between polymer chains of the at least one polymeric binder resin.

10. The wood composite material according to claim 1, wherein said composite material achieves a limiting oxygen index in the range of about 26 to about 40, an average thickness swelling in the range of about 7% to about 15 %, and said composite material has a fire spread rating of greater than about 25 and less than about 75.

11. The wood composite material according to claim 1, wherein the wood composite material is selected from the group consisting of plywood, particleboard, flakeboard, and oriented strand board.

12. The wood composite material according to claim 1, wherein the wood composite material is selected from the group consisting of flakeboard and oriented strand board.

13. A process for preparing a fire retardant oriented strand board composite material comprising the steps of:

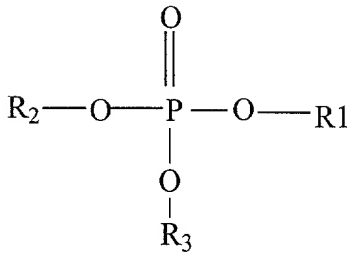
(1) coating wood strands or flakes with at least one polymeric binder, wax, and at least one organophosphorus ester,

(2) forming a mat of said coated wood strands or flakes, and

(3) compressing said mat under heat and pressure to form an oriented strand board composite panel,

wherein upon compression the at least one organophosphorus ester forms cross-links between polymer chains of the at least one polymeric binder resin.

14. The process according to claim 13, wherein the organophosphorus ester has the formula:



wherein R_1, R_2 and R_3 are independently either alkyl or aryl chains having hydroxyl, carboxylic or both hydroxyl and carboxylic functionality.

15. The process according to claim 14, wherein said polymeric binder selected from the group consisting of 4,4'-diphenylene methane diisocyanate; phenol formaldehyde and melaine urea formaldehyde.

16. The process according to claim 13, wherein the organophosphorus ester is at least one ester selected from the group consisting of diethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphate; dimethyl methyl phosphate; diethyl-N, N-bis(2-hydroxyethyl) aminoethyl phosphonate; dimethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphonate; dipropyl-N, N-bis(3-hydroxypropyl) aminoethyl phosphonate; and dimethyl-N, N-bis(4-hydroxybutyl) aminomethyl phosphonate.

17. The process according to claim 13, wherein the organophosphorus ester is at least one ester selected from the group consisting of diethyl-N, N-bis(2-hydroxyethyl) aminomethyl phosphate and dimethyl methyl phosphate.

18. The process according to claim 13, wherein the oriented strand board composite material comprises about 5 to about 30 wt % of the organophosphorus ester compound.

19. The process according to claim 13, wherein the oriented strand board composite material comprises about 5 to about 30 wt % of the organophosphorus ester and about 3 to about 20 wt % of the polymeric binder.

20. The process according to claim 13, wherein the oriented strand board composite material has a limiting oxygen index in the range of about 26 to about 40, an average thickness swelling in the range of about 7% to about 15 % and has a fire spread rating of greater than about 25 and less than about 75.